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EXAMINER

MISLEH, JUSTIN P

ART UNIT	PAPER NUMBER
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2612

DATE MAILED: 05/06/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/500,988

Applicant(s)

SHIBAZAKI, KIYOSHIGE

Examiner

Justin P Misleh

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 - 11 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 - 11 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 February 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 2 March 2004 have been fully considered but they are not persuasive.
2. In regards to the Rejection of Claims 1 – 7, the Applicant argues against Kothari et al. on the basis that there is no suggestion in Kothari et al. to modify figure 5 of the prior art system in the manner proposed in the Non-Final Office Action (Paper No. 8, 2 September 2003). The Applicant supports this conclusion by explaining that the prior art systems comprise an amplifier that sequentially converts each of the electrical charges transferred from the photoelectric conversion elements and that the amplifier is active for all or most of the operation time of the image sensory array and that in Kothari et al. an amplifier is provided for each photodiode such that each photosite cell has its own amplifier and that the overall duty cycle of any individual amplifier will be quite short in proportion to the total time of operation of the image sensor array.
3. In response to Applicant's argument that there is no suggestion to modify the prior art of figure 5 with the different one-to-one system of Kothari et al., the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

In the Non-Final Office, the Examiner relied on the Applicant's conceded prior art, as shown in figure 5, to disclose a plurality of photoelectric conversion elements (1) that are two-dimensionally arrayed; a charge transfer circuit (2 and 3) that transfers electrical charges from said photoelectric conversion elements; and an amplifier (4) that is connected to an end of said charge transfer circuit along a direction of charge transfer, converts an electrical charge into voltage (floating diffusion amplifier; see page 2, lines 14 – 19), and amplifies the voltage, wherein at least said photoelectric conversion elements (1), said charge transfer circuit (2 and 3) and said amplifier (4) are provided on a single semiconductor substrate. The Examiner explicitly stated, "the Applicant does not disclose in the conceded prior art the said image-capturing device further comprises an amplifier power control circuit that controls power to said amplifier in conformance to a control signal provided from outside."

Therefore, the Examiner introduced Kothari et al. to teach, *inter alia*, an amplifier power control circuit. More specifically, the Examiner stated, "Kothari et al. also disclose ... an image-capturing device (10) comprising a plurality of photoelectric conversion elements (14), a charge transfer circuit (20), and an amplifier (33). Kothari et al. also disclose the image-capturing device (10) further comprising an amplifier power control circuit (provided by areas 50, 52, 54, and 56) that controls power (see column 5, lines 47 – 52) to said amplifier in conformance to a control signal (\emptyset PIX and \emptyset NPIX) provided from outside (the controls signal are provided from the shift register and logic circuitry 24, which is outside the amplifier)."

Next, the Examiner provided motivation to include the teaching of Kothari et al. in the prior art system of the Applicant. Once again, the Examiner explicitly stated, "As stated in column 1 (lines 38 – 48), at the time the invention was made, one with ordinary skill in the art

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would have been motivated to modify the Applicant's conceded prior art according to the teachings of Kothari et al. as a means to lower the total power requirements of the single semiconductor substrate. Therefore, at the time the invention was made, it would have been obvious to one with ordinary skill in the art to modify the Applicant's conceded prior art according to the teachings of Kothari et al.

As just demonstrated by the Examiner, the bottom line is that the Applicant's conceded prior art discloses, at the very least, an image-capturing device with a charge transfer circuit and an amplifier connected to an end of the charge transfer circuit and Kothari et al. teach, at the very least, an amplifier power control circuit that controls power to an amplifier in conformance to a control signal provided from outside. And also as stated above, the test for obviousness is what the combined teachings of the references would have suggested to those of ordinary skill in the art. Furthermore, the motivation to combine the teachings of the reference is found in Kothari et al. and one with ordinary skill in the art, at the time the invention was made, would have been motivated to combine the teaches as a means for lowering the total power requirements of the single semiconductor substrate.

4. Applicant's arguments with respect to Claims 8 – 11 have been considered but are moot in view of the new ground(s) of rejection. Due to the amendments to Claim 8, the Examiner maintains that Claims 8 – 11 are rejected under 35 U.S.C. 102(e) as being anticipated by Wacyk, however, a new interpretation of Wacyk is used.

5. As a result of the Applicant's amendments, there are no further objections to the Specification and to Claims 6 and 7.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. **Claims 8 – 11** are rejected under 35 U.S.C. 102(e) as being anticipated by Wacyk. For the following rejections, please refer to figure 2 and columns 3 (lines 31 – 54), 4 (lines 13 – 26), and 6 (lines 25 – 46).

8. For **Claim 8**, Wacyk discloses an image-capturing device (sensor 30) comprising:

a plurality of photoelectric conversion elements (31); and

a heat generating component that constitutes a local heat source and includes at least an amplifier that converts an electrical charge from the photoelectric conversion elements (31) into voltage and amplifies the voltage (see **Description A** below), wherein:

said plurality of photoelectric conversion elements (31) and said heat generating component are provided on a single semiconductor substrate (see column 2, lines 48 – 59); and

said image-capturing device further comprises a heat generating component power control circuit (Power Source 37) that controls power to said heat generating component in conformance to a control signal provided from outside, the power to said heat generating component being provided from the outside (see **Description B** below).

Description A

Wacyk discloses that U.S. 5,841,126 issued to Fossum et al. is incorporated by reference to provide the details of the CMOS image sensor (sensor 30). Fossum et al. discloses an active pixel sensor CMOS image sensor (figure 1). Furthermore, Fossum et al. states, "An active pixel sensor includes both a photodetector and the readout amplifier integrated within the same substrate as the light collecting device, e.g., the photodiode. The readout amplifier is preferably within and/or associated with a pixel." Referring to figure 1, the circuitry located between the photodetector (100) and the column bus (112) is a floating diffusion amplifier that converts an electrical charge from the photoelectric conversion elements into voltage and amplifies the voltage. Therefore, it clear that the image sensor (30) of Wacyk is an active pixel sensor CMOS image sensor. In the very least, anything that passes electric charge, voltage, or current constitutes a heat generating component. Thus, as interpreted by the Examiner, the individual amplifiers within the CMOS image sensor (30), the A/D converter (34), and the Digital Signal Processor (35) together constitute the required heat generating component all provided on a single semiconductor substrate.

Description B

Initially, at the bare minimum, the Applicant's "outside" requirement is interpreted by the Examiner as referring to "outside" the heat generating component and not *inside (or from within)* the heat generating component. Furthermore, Wacyk discloses a local power supply (37), which provides power to the local single substrate components: the plurality of photoelectric conversion elements (31) and the heat generating component (see above). Therefore, the local power supply

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is the heat generating component power control circuit that controls power to the said heat generating component from “outside” the heat generating component. Wacyk discloses, as stated in column 6 (lines 25 – 46), that the heat generating component power control circuit (local power supply 37) provides power to the said heat generating component by acquiring electromagnetic radiation, i.e. “free power”, which emanates from ambient energy sources. The ambient energy sources may be ambient light or RF energy. “Free power” is clearly “outside” the heat generating component and clearly “outside” of the single semiconductor substrate. Therefore, the heat generating component power control circuit (local power supply 37) provides power to the said heat generating component in conformance to a control signal provided from outside wherein the control signal is simply the acquired outside “free power”.

9. As for **Claim 9**, Wacyk discloses, an image-capturing device according to Claim 8, wherein: said plurality of photoelectric conversion elements are two-dimensionally arrayed on said semiconductor substrate (clearly shown in figure 2).

10. As for **Claim 10**, Wacyk discloses, an image-capturing device according to Claim 8, wherein: said heat generating component is an A/D converter (34; please see figure 2).

11. As for **Claim 11**, Wacyk discloses, an image-capturing device according to Claim 8, wherein: said heat generating component is a signal processor (35; please see figure 2).

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. **Claims 1 – 7** are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's conceded prior art in view of Kothari et al.

14. For **Claim 1**, the Applicant discloses, as the conceded prior art, as shown in figures 5 – 7 and as stated on pages 1 – 3, an image-capturing device (see figure 5) comprising:

a plurality of photoelectric conversion elements (1) that are two-dimensionally arrayed;
a charge transfer circuit (2 and 3) that transfers electrical charges from said photoelectric conversion elements;

and an amplifier (4) that is connected to an end of said charge transfer circuit along a direction of charge transfer, sequentially converts each of the electrical charges into voltage (floating diffusion amplifier; see page 2, lines 14 – 19), and amplifies the voltage, wherein:

at least said photoelectric conversion elements (1), said charge transfer circuit (2 and 3) and said amplifier (4) are provided on a single semiconductor substrate.

However, the Applicant does not disclose in the conceded prior art the said image-capturing device further comprises an amplifier power control circuit that controls power to said amplifier in conformance to a control signal provided from outside.

Kothari et al. also disclose, as shown in figures 1 – 3 and as stated in columns 2 (lines 59 – 67), 3 (lines 1 – 25 and 42 – 59), 5 (lines 8 – 67), and 6 (lines 1 – 47), an image-capturing device (10) comprising a plurality of photoelectric conversion elements (14), a charge transfer circuit (20), and an amplifier (33). Kothari et al. also disclose the image-capturing device (10) further comprising an amplifier power control circuit (provided by areas 50, 52, 54, and 56) that controls power (see column 5, lines 47 – 52) to said amplifier in conformance to a control signal

(ØPIX and ØNPIX) provided from outside (the controls signal are provided from the shift register and logic circuitry 24, which is outside the amplifier). As stated in column 1 (lines 38 – 48), at the time the invention was made, one with ordinary skill in the art would have been motivated to modify the Applicant's conceded prior art according to the teachings of Kothari et al. as a means to lower the total power requirements of the single semiconductor substrate. Therefore, at the time the invention was made, it would have been obvious to one with ordinary skill in the art to modify the Applicant's conceded prior art according to the teachings of Kothari et al.

15. As for **Claim 2**, Applicant's conceded prior art in view of Kothari et al. disclose, an image-capturing device according to Claim 1, wherein: said amplifier power control circuit (provided by areas 50, 52, 54, and 56) changes a bias current supplied to said amplifier by using said control signal (see column 5, lines 12 – 15, and column 6, lines 6 – 21). The control signal (ØPIX and ØNPIX) controls the amplifier power control circuit to change the bias current (V_{bias}) supplied to the amplifier.

16. As for **Claim 3**, Applicant's conceded prior art disclose, as stated on page 1 (line 23), an image-capturing device according to Claim 1, wherein: said charge transfers the electrical charges to said amplifier by employing a CCD (charge-coupled device).

17. As for **Claim 4**, Applicant's conceded prior art disclose an image-capturing device according to Claim 1, wherein: said charge transfers the electrical charges to said amplifier by employing a CCD (charge-coupled device). However, the Applicant's conceded prior art do not disclose wherein the said charge transfer circuit reads the electrical charges out to said amplifier through XY address scanning. Kothari et al. disclose, as taught above, an image-capturing

device comprising a plurality of photoelectric conversion elements (14) wherein a charge transfer circuit (20) and an amplifier (33) are associated with each photoelectric conversion element.

Kothari et al. also disclose an amplifier control circuit that controls power the amplifier in conformance to a control signal. Kothari et al. teach a one-dimensional array of photoelectric conversion elements, however, as stated in column 3 (lines 4 – 10), the one-dimensional may also be a two-dimensional array of MOS type photosites (photoelectric conversion elements). It is inherent to MOS type photosites, arranged in a two-dimensional array, to access the electrical charges through XY address scanning. Therefore, Applicant's conceded prior art in view of Kothari et al. teach an image-capturing device according to claim 1 wherein: wherein the said charge transfer circuit reads the electrical charges out to said amplifier through XY address scanning.

18. For **Claim 5**, as stated in the MPEP § 2111.02 (please see also *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 – CCPA 1951), the preamble of the claim neither recites the limitations of the claim nor is the preamble necessary to give life, meaning, and vitality to the claim, therefore, the preamble is not served to further define the structure of the claim.

The Applicant discloses, as the conceded prior art, as shown in figures 5 – 7 and as stated on pages 1 – 3, an image-capturing device (see figure 5) that captures an image of a subject and outputs image data, wherein said image-capturing device comprises:

- a plurality of photoelectric conversion elements (1) that are two-dimensionally arrayed;
- a charge transfer circuit (2 and 3) that transfers electrical charges from said photoelectric conversion elements;

and an amplifier (4) that is connected to an end of said charge transfer circuit along a direction of charge transfer, sequentially converts each of the electrical charges into voltage (floating diffusion amplifier; see page 2, lines 14 – 19), and amplifies the voltage, wherein:

at least said photoelectric conversion elements (1), said charge transfer circuit (2 and 3) and said amplifier (4) are provided on a single semiconductor substrate.

However, the Applicant does not disclose in the conceded prior art the said image-capturing device further comprising an amplifier power control circuit that controls power to said amplifier in conformance to a control signal provided from outside and a control device that performs a specific type of image processing on the image data.

In regards to the control device, Official Notice that both the concepts and advantages of providing a control device that performs a specific type of image processing on the image data are well known and expected in the art. It would have been obvious to one with ordinary skill in the art to have provided a control device that performs a specific type of image processing on the image data with the image-capturing device that outputs image data as taught in the Applicant's conceded prior art as means to provide processed image data ready for display, transmission, and/or storage.

In regards to the amplifier power control circuit, Kothari et al. also disclose, as shown in figures 1 – 3 and as stated in columns 2 (lines 59 – 67), 3 (lines 1 – 25 and 42 – 59), 5 (lines 8 – 67), and 6 (lines 1 – 47), an image-capturing device (10) comprising a plurality of photoelectric conversion elements (14), a charge transfer circuit (20), and an amplifier (33). Kothari et al. also disclose the image-capturing device (10) further comprising an amplifier power control circuit (provided by areas 50, 52, 54, and 56) that controls power (see column 5, lines 47 – 52) to said

amplifier in conformance to a control signal (\emptyset PIX and \emptyset NPIX) provided from outside (the controls signal are provided from the shift register and logic circuitry 24, which is outside the amplifier). As stated in column 1 (lines 38 – 48), at the time the invention was made, one with ordinary skill in the art would have been motivated to modify the Applicant's conceded prior art according to the teachings of Kothari et al. as a means to lower the total power requirements of the single semiconductor substrate. Therefore, at the time the invention was made, it would have been obvious to one with ordinary skill in the art to modify the Applicant's conceded prior art according to the teachings of Kothari et al.

19. As for **Claim 6**, Kothari et al. disclose, an electronic camera according to Claim 5 (please see claim 5 above), wherein: said amplifier power control circuit controls the power to said amplifier so that a normal bias current is supplied to said amplifier in conformance to said control signal when discharging unnecessary electrical charges and reading out electrical charges from said photoelectric conversion elements, and the bias current to said amplifier is reduced in conformance to said control signal at other times.

Kothari et al. teach, as stated in columns 5 (lines 8 – 67) and 6 (lines 1 – 47), that the amplifier power control circuit (provided by areas 50, 52, 54, and 56) changes a bias current supplied to said amplifier by using said control signal. The control signal (\emptyset PIX and \emptyset NPIX) controls the amplifier power control circuit to change the bias current (V_{bias}) supplied to the amplifier. The amplifier power control circuit powers up the amplifier during the reading out of electrical charges from said photoelectric conversion elements by and the amplifier is powered down at all other times. The amplifier power control circuit powers up the amplifier by applying an \emptyset PIX=0 and \emptyset NPIX=1 control signal so that a normal bias current is supplied to the

amplifier (as shown in figure 2). The amplifier power control circuit powers down the amplifier by applying an $\phi_{PIX}=1$ and $\phi_{NPIX}=0$ control signal so that a reduced bias current ($V_{bias}=0$) is supplied to the amplifier. Kothari et al. teach discharging unnecessary electrical charges from the photoelectric conversion elements and reading out electrical charges from the photoelectric conversion elements, since, discharging unnecessary electrical charges from the photoelectric conversion elements and reading out electrical charges from the photoelectric conversion elements are both a process of reading out electrical charges (regardless of whether unnecessary or necessary) from the photoelectric conversion elements.

20. As for **Claim 7**, Applicant's conceded prior art in view of Kothari et al. disclose, an electronic camera according to Claim 6, wherein: said amplifier power control device controls the power to said amplifier so that the normal bias current is supplied to said amplifier in conformance to said control signal when exposure is performed over a length of time equal to or less than a specific length of time.

It is inherent to the Applicant's conceded prior art image-capturing device to provide an exposure means to the plurality of photoelectric conversion elements wherein the plurality of photoelectric conversion elements are exposed to the image of a subject for a specific length of time, since, if the plurality of photoelectric conversion elements are over-exposed, saturation of the plurality of photoelectric conversion elements would occur and provide useless image data. Kothari et al. teach that a normal bias current is supplied to the amplifier in conformance to the control signal only during the reading out of electrical charges from the plurality of photoelectric conversion elements. Since, the plurality of photoelectric conversion elements are exposed for a specific length of time and since the electrical charges are read out during times of non-exposure,

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regardless of whether the exposure time was equal to or less than the specific length of time, electrical charges would still be read out of the plurality of photoelectric conversion elements during times on non-exposure and therefore, a normal bias current would be supplied to the amplifier in conformance with the control signal.

Conclusion

21. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Justin P Misleh whose telephone number is 703.305.8090. The Examiner can normally be reached on Monday through Thursday from 7:30 AM to 5:30 PM and on alternating Fridays from 7:30 AM to 4:30 PM.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Wendy R Garber can be reached on 703.305.4929. The fax phone number for the organization where this application or proceeding is assigned is 703.872.9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JPM
April 22, 2004


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